

TO: Stormwater Tech Team

FROM: Karen Tarnow and Mike Poulsen, DEQ

DATE: 10/21/08

RE: EPA's Draft Approval Letter for Stormwater Loading Calculations

Kristine asked for our input on some issues that have been raised about certain comments in the attachment to her draft approval letter. As we understand it, the issues had to do with the comments on how the flow-weighted method (i.e., Method #2) should be approached. Here are our thoughts.

For Method #2 (see Page A-9 of Kristine's Enclosure A), we recommend a different approach than the approach described in the enclosure.

1. **We recommend using the average concentration from each sample location** rather than each individual sample **result**.
 - Using each individual sample point would **skew the representative concentration** toward the outfalls where we analyzed more samples since some outfalls have more samples than others.
2. **We recommend using the same rainfall event to calculate flow volume from each site** rather than using the Grid model to calculate flows for each sample event from each **outfall**.
 - If we use the average concentration from each outfall as recommended above, Kristine's proposed approach would no longer be relevant.
 - Even if this wasn't the case, we don't feel that the level of effort required to determine the volume of runoff from each storm event at each outfall would be warranted given how much additional uncertainty this introduce into the effort (e.g., uncertainties involved in calculating site-specific runoff volumes with a model that may not accurately reflect pervious/impervious surface within each outfall basin and rain data that may not accurately reflect the amount of rain that fell upon each outfall basin).
3. **We do not agree that the presence or absence of a correlation between flow and concentration is a relevant consideration** for the weighted approach (top of Page A-10).
 - As we expressed in our 9/18/08 memo (excerpted below), we don't agree that the weighted approach is based upon a correlation between flow and concentration:

Commented [KK1]: There is not enough data from each sample location to do this. Would require a minimum of 10 samples per site. Additionally, the number of sites is not great enough to conduct robust statistics (<10 sites per land use).

Commented [KK2]: I disagree – if the flow is vastly different between sites, then a site with 5 samples (max) would not skew the data over a site with 3 samples (min). I don't think this will happen for very many parameters, either.

Commented [KK3]: This would skew the "calibration" because there could be variation in storm events. It is important to have accurate numbers prior to extrapolating to other sites and to other flow events.

Commented [KK4]: We are not looking for a central tendency – we are looking for a range of loads; one being central tendency and the other being worst case. This would not allow for that. While this is a good hypothesis, there is no information presented to substantiate it – need citations to other literature, etc.

“The premise behind “weighting” the data is based upon the assumption that the concentration of larger basins will be more representative of the central tendency of concentrations from all sites of this LU because the runoff from these sites already “averages” the runoff from a mix of activities and pervious/impervious surfaces. Thus, the relationship is not between flow and concentration, but between flow and representativeness of concentration. We use flow in the equation rather than area because flow captures the variable of perviousness in addition to area.”

- We feel that the results of the flow-weighted approach are valid and do not require justification beyond what we described in our 9/18/08 memo:

“[The weighted approach] assumes that larger basins will encompass a greater diversity of activities for this LU as well as a greater mix of pervious/impervious surfaces. Since the runoff from the site integrates the volume and concentration of runoff from each unique activity area, the resulting concentration will be more representative of the central tendency of concentrations from all sites within this LU. Therefore, the data from each sampled location should be weighted proportional to the flow from that basin before averaging the results when calculating the representative concentration for this LU.”

4. We note that Kristine’s memo does not propose an approach for determining the range of loads to be used as inputs in the modeling exercises given that will have two sets of results for each contaminant (i.e., results from both the weighted and unweighted approaches).

Commented [KK5]: EPA has included a check-in point that will provide this (refer to #4 in Enclosure B).

- In our 9/18/08 memo, we voiced our concern about moving forward without a predetermined approach for working with two sets of results. We suggested that one simple solution would be to select one method to go forward with. If we took this path, we suggested selecting the weighted approach because we felt it would better characterize the appropriate LU concentration.
- That said, if we go forward with both methods, we recommend using the approaches discussed in our 9/18/08 memo to determine the range of concentrations for each approach to be used in modeling. For Method #1, that would involve looking at the distribution of concentrations and taking percentiles or some other method to characterize variability. For Method # 2, it would involve taking the low and high ends of the range of mean concentrations in the basins.